TWO NEW ENDEMIC SPECIES OF *CALATHEA* (MARANTACEAE) FROM ECUADOR

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ABSTRACT

Calathea neillii H. Kenn. and **Calathea fredii** H. Kenn., both endemic to Ecuador, are described as new. Both species are distinguished by their inflorescences of bright red, distichous, bracts. They are most similar in aspect to *Calathea trianae* L.B. Smith & Idrobo from Dept. Nariño, Colombia. *Calathea neillii* differs from *C. trianae* in the narrowly ovate to narrowly ovate-elliptic vs. elliptic leaf blade (length:width ratios 5.87–6.93:1 vs. 3.55–4.58:1), the shorter peduncle (1.1–1.4 vs. 10–14.6 cm), and the relatively broader inflorescence (length:width ratios 2.4–2.9:1 vs. 6.0–7.33:1). *Calathea fredii* differs from *C. trianae* by the strongly corrugated vs. smooth leaf surface, narrowly elliptic vs. elliptic leaf blade (length:width ratios [4.8–]5.24–7.45:1 vs. 3.55–4.58:1), and the purple and white vs. yellow petals.

RESUMEN

Calathea neillii H. Kenn. y **Calathea fredii** H. Kenn., ambas plantas endémicas de Ecuador, se describen como nuevas especies. Las dos se distinguen por sus inflorescencias con brácteas dísticas de color rojo brillante. Son similares en aspecto a *Calathea trianae* L.B. Sm. & Idrobo de Dept. de Nariño, Colombia. *Calathea neillii* se distingue de *C. trianae* por sus hojas con la lámina foliar de angosta ovada a angosta ovado-elíptica vs. elíptica (la relación largo /ancho 5.87–6.93:1 vs. 3.55–4.58:1), el pedúnculo más corto (1.1–1.4 vs. 10–14.6 cm), la inflorescencia relativamente más ancha (la relación largo /ancho es 2.4–2.9:1 vs. 6.0–7.33:1). *Calathea fredii* se distingue de *C. trianae* por la lámina foliar fuertemente plegada vs. plana, sus hojas angostas elípticas vs. elípticas (la relación largo /ancho ([4.8–] 5.24–7.45:1 vs. 3.55–4.58:1), y los pétalos purpúreos y blancos vs. amarillos.

Since the publication of the treatment of Marantaceae for the *Flora of Ecuador* (Kennedy et al. 1988) there has been a substantial increase in field work there. Consequently a number of new species have come to the attention of various specialists, including the two being described herein. Of the total of 96 species in the 1988 flora publication, 64 were in the genus *Calathea*. Of these, 32 species were noted as endemic with 29 in the genus *Calathea*. However, five of these 29 species were undescribed when collected in Carchi Prov., sufficiently near the border with Colombia to reasonably be expected there as well, though not yet documented. Currently a total of 69 species of *Calathea* are recognized for Ecuador: the two new species being described, two additional undescribed species plus *Calathea wallisii* (Linden) Regel, known from Perú. Borchsenius et al. (2012) included less than 15% of the species of *Calathea* in their molecular phylogeny, but were confident enough to remove most species to the resurrected genus *Goeppertia* Nees. Both of these new species herein have considerable horticultural potential as they have brilliant red bracts, a character rather uncommon in *Calathea*. I am less sanguine about their sample size, but in any case, the two species described herein seem most likely to be related to either the "*C. lanicalis* Group" (Kennedy et al. 1988), which includes the red-bracted *C. timothei* H. Kenn., or *C.* section *Calathea*, which has distichous bracts. Both of these groups remain in *Calathea* according to Borchsenius et al. (2012).

TAXONOMIC TREATMENT

Calathea neillii H. Kenn., sp. nov. (**Figs. 1, 3**). TYPE: ECUADOR. ZAMORA-CHINCHIPE: Cantón Yantzaza, Cordillera del Cóndor region, Río Machinaza watershed, E of Los Encuentros, Refugio de Vida Silvestre "El Zarza," near San Antonia guard post, 0.25-hectare forest inventory plot, "Aurelian Plot 9," tall wet forest, canopy 25 m tall, on mixed clay/sand soil, shady forest understory, 1560 m, 03°50'37"S, 78°31'48"W, 20 Jul 2009, *D. Neill, W. Quizhpe & D. Vela 16668* (HOLOTYPE: QCNE; ISOTYPES ECUAMZ, MO, UCR).

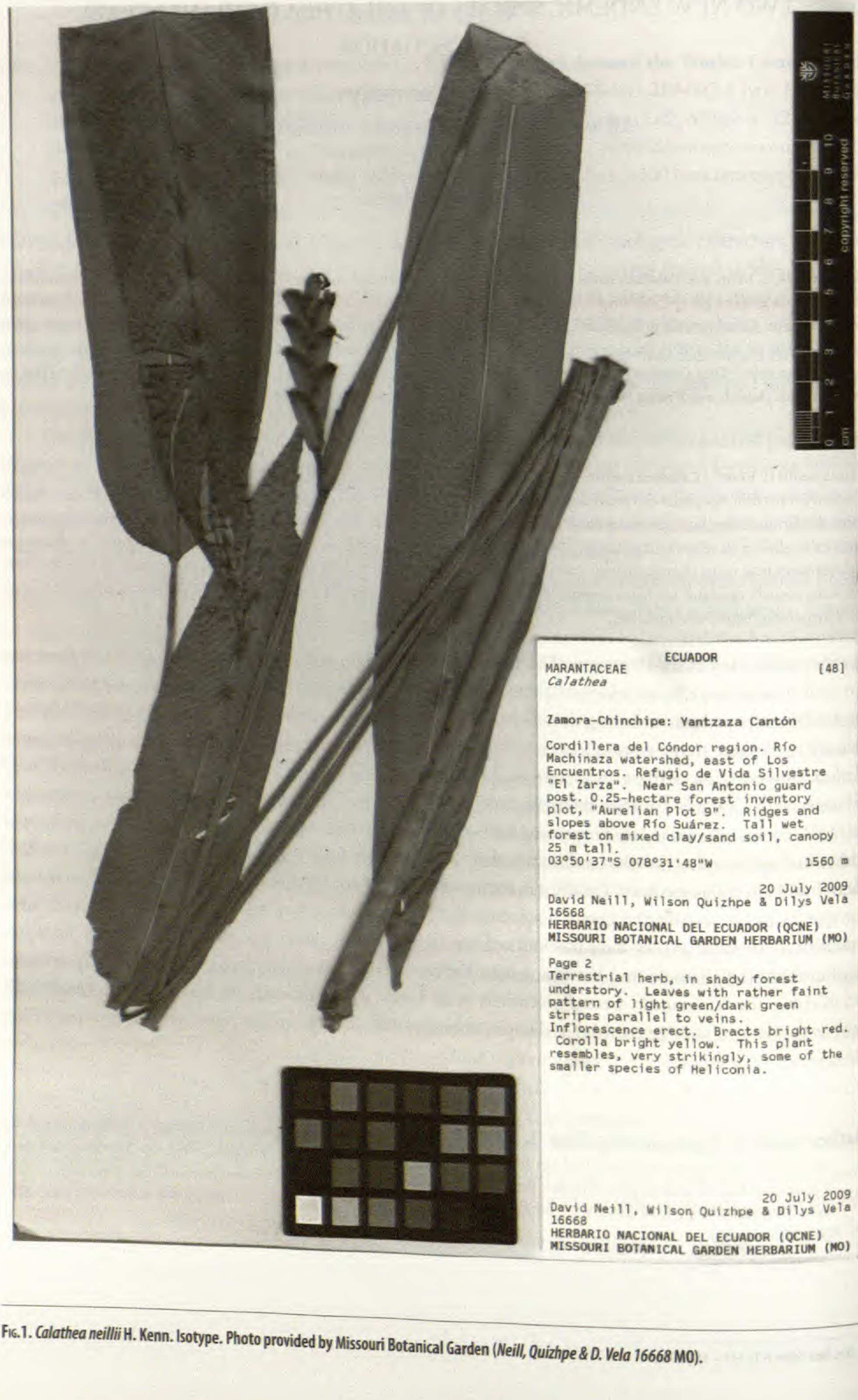

Fig. 1. *Calathea neillii* H. Kenn. Isotype. Photo provided by Missouri Botanical Garden (*Neill, Quizhpe & D. Vela 16668* MO).

Calathea neillii differs from *C. trianae* in the narrowly ovate to narrowly ovate -elliptic vs. elliptic leaf blade (length:width ratios 5.87–6.93:1 vs. 3.55–4.58:1); the shorter peduncle, 1.1–1.4 vs. 10–14.6 cm; and the relatively broader inflorescence (length:width ratios 2.4–2.9:1 vs. 6.0–7.33:1) with more closely spaced bracts (6 vs. 3 per 5 cm).

Plants rhizomatous, caulescent, herbs, ca 0.6 m high; stem dark olive-green, densely tomentose at junction to leaf sheath, bearing sparse, scattered hairs basally, hairs 0.2 mm, stem internodes between basal leaves sericeous, hairs to 4 mm. **Leaves** 4–7 basal with a single cauline leaf borne above an elongate stem internode, ca. 40 cm; leaf sheath not auriculate, sheath of subtending leaf ca. 7 cm with wings and base reddish purple, the center adaxial portion deep olive-green in upper 3/4, tomentose at base, subglabrous to glabrous apically, sheath of basal leaves 21–23 cm, tomentose apically on wings, margins densely appressed tomentose, hairs to 0.5 mm, hairs sparse on center back and wings basally; petiole green, glabrous, subglabrous just above sheath, ca. 3.5 cm in subtending leaf, (6.5–)12–18.4 cm in others; pulvinus 1–1.4 cm, olive-green, minutely tomentose, hairs to 0.5 mm, densely so adaxially, sparsely so abaxially and on sides, acuminately extended adaxially to 0.5 cm; leaf blade not ridged, the tissue between the raised major veins forming a smoothly curved shallow depression, narrowly ovate to narrowly ovate-elliptic, left side broader than right, apex acuminate attenuate, base obtuse to 90°, shortly abruptly attenuate; 24.5–31.4 × 3.6–4.6 cm (length:width ratios 5.87–6.93:1), generally 7 minor veins between major veins, vein angle from midrib 40° to 50°, lateral veins ca. 13 per 2 cm, cross-veinlets 30 to 40 per 5 mm (veins measured at midpoint of each side of blade), adaxial surface semi-shiny deep green, major veins minutely tomentose, in the basalmost 1 cm, the hairs are also present in the area between the veins, the marginal 2 mm of right side of blade minutely tomentose with the acumen densely so, hairs colorless, 0.1–0.3 mm, midrib paler, whitish green, minutely tomentose, abaxial leaf surface light green, glabrous, midrib glabrous except basal 1.5 cm tomentose where pulvinar cells extend onto midrib. **Inflorescence** terminal, 1 per shoot, ellipsoid-rectangular, ca. 5 × 1.5 cm; peduncle rose-red, densely appressed tomentose apically at junction to bract, 1.1–1.4 cm. **Bracts** 7–8, distichous, subrotund, apex retuse, margins and apex straight, not recurved, 2.1–2.3 × 1.9–2.2 cm, each subtending up to 3 or more flower pairs, abaxial surface rose-red, glabrous; bicarinate prophyll membranous, ovate, apex obtuse, translucent rose-red, glabrous except appressed pilose abaxially in basal 1/3–1/2 adjacent to carinas, hairs 0.7 mm, 1.9–2.1 × 0.65–0.7 cm, 0.5–0.55 cm wide, carina to carina; secondary bracts absent; bracteoles 2 per flower pair, membranous, medial, 1 chanelled, 1 carinate, narrowly elliptic, glabrous, 1.3–1.4 (–2) × 0.3–0.35 cm. **Flowers** opening spontaneously. **Sepals** membranous, narrowly elliptic, broadly obtuse, glabrous, 14.5–15.5 × 3–3.5 mm. **Corolla** yellow, tube glabrous, 17–18 mm; corolla lobes subequal, elliptic, 6–8 × 2.5–3 mm, obtuse, margins inrolled appearing acute, sparsely pilose in apical 1/4, hairs 0.2 mm. **Staminodes** 3, yellow; outer staminode obovate, emarginate; callose staminode petaloid apically, ca.6.5 mm; cucullate staminode 3.5–4.5 mm; stamen with lateral petaloid appendage; anther 1.5–2 mm; ovary smooth, glabrous, 2–2.5 mm. **Capsule** unknown.

Distribution and habitat.—Calathea neillii is endemic to Ecuador, known only from the type locality in the Cordillera del Cóndor region of Prov. Zamora-Chinchipe. It occurs at 1560 m elevation in the shady understory of wet forest habitat. The type was collected in flower in July.

Discussion.—Calathea neillii, shares a similar general habit of several basal leaves and an inflorescence of distichous bright red bracts borne above an elongate stem internode with both *C. fredii* and *C. trianae*. *Calathea neillii* differs from *C. trianae* in the narrowly ovate to narrowly ovate-elliptic vs. elliptic leaf blade (length:width ratios 5.87–6.93:1 vs. vs. 3.55–4.58:1), minor veins usually 7 vs. 3 between major veins, the petiole glabrous vs. pilose, the shorter peduncle (1.1–1.4 vs. 10–14.6 cm), and the relatively broader inflorescence (length:width ratios 2.4–2.91 vs. 6.0–7.33:1) with more closely spaced bracts (6 vs. 3 per 5 cm). It differs from *C. fredii* in the smooth rather than strongly corrugated leaf surface, the lower vein angle from midrib (40°–50° vs. 73°–79°), the broader vein spacing (ca. 13 vs. 19–24 per 2 cm) and the yellow vs. purple petals.

Rare species from tropical wet forests, known only from a few collections, are by necessity described using a phenetic species concept. The members of the species show overall similarity and are separated from all other species by a gap in variation (Judd et al. 2008: 145). This gap requires constant differences in several genetically controlled characters in order to prevent single gene mutations or morphs in a polymorphic character from being described as species.

Etymology.—The specific epithet, *neillii*, is in honor of David Neill, Director of Investigación, Universidead Estatal Amzonica, Puyo, Ecuador, and principal investigator on the Ecuadorian "Cordillera del Condór project." As co-founder of the Estación Biológica de Jatun Sacha he has been and is a prolific collector of Ecuadorian plants, including many undescribed species, of which this one, honoring him, is an especially attractive one.

Iconography.—Images of type scans of *Calathea trianae*, to compare with those of *C. neilii* and *C. fredii* are accessible through JSTOR at http:plants.jstor.org/search?plantName="Calathea+trianae"&syn=1. A good image is that at NY of an isotype.

Calathea fredii H. Kenn., sp. nov. (**Figs. 2, 3**). TYPE: ECUADOR. NAPO: De la carretera entre Reventador y Lumbaquí, 10 km al sur, Río Tigre, bosque pluvial premontano, colinas rocosas, en margin de bosque, 800 m, 00°05'S, 77°24'W, 6 Dec 1986, *D. Neill 7537*(HOLOTYPE: MO).

Calathea fredii differs from *C. trianae* by the strongly corrugated vs. smooth leaf surface, narrowly elliptic vs. elliptic leaf blade (length:width ratios [4.8–] 5.24–7.45:1 vs. 3.55–4.58:1), the relatively broader inflorescence (length:width ratios 1.77–2.21:1 vs. 6.0–7.33:1) and the purple vs. yellow petals.

Plants rhizomatous, caulescent herbs, 0.9–1.2 m; roots stiff, wiry; stem sericeous apically adjacent to cataphyll, glabrous below; cataphylls stiff, papyraceous, narrowly ovate, apiculate, appressed tomentose to subhispid, rough to the touch, hairs, ca. 0.5 mm on minute papillae, innermost cataphyll ca. 26 cm. **Leaves** 3–8 basal and a single cauline bladeless sheath above an elongate internode of ca. 0.6–1 m; leaf sheath not auriculate, wings and adjacent sides subglabrous, center back slightly scabrid; bladeless sheath (cataphyll) subtending inflorescence 9.5–10.5 cm long, sheath of basal leaves 23–45.5 cm; petiole green, appressed tomentose adaxially in apical 1 cm, minutely scabrid below to nearly smooth above sheath, (9–)16.5–62 cm; pulvinus round in cross-section, 1.3–3.8 cm, olive-green, tomentose adaxially, the rest glabrous, hairs straw-colored 1–1.5 mm; leaf blade plicate, markedly ridged with major veins on raised ridges, minor vein in depressions between, chartaceous, narrowly elliptic, apex acuminate-attenuate, slightly eccentric, base obtuse to 90°, 31.5–48 × 5.2–10 cm (length:width ratios [4.8–] 5.24–7.45:1), lateral veins 19 to 24 per 2 cm, cross-veinlets ca. 50 per 5 mm (veins measured at midpoint of each side of blade), vein angles from midrib 73°–79°, measured at midpoint of blade, adaxial surface deep green, glabrous except sparsely pilose at base and along margin of wider side, midrib deep green, glabrous basally, apical 10 cm pilose, abaxial leaf surface grey-green, scattered pilose, each hair on a raised basal cushion of cells, hairs straw-colored, midrib yellow-green to caramel-colored, appressed pilose. **Inflorescences** 1–3 per shoot, 1 terminal, subsequent ones borne in axil of bladeless sheath, imbricate, rectangular, complanate, 5.5–8.3 × 3.1–4.6 cm; peduncle dark purple-brown, tomentose in apical 1–1.5 cm, glabrous basally, 14–21.5 cm. **Bracts** 10–13, distichous, herbaceous, very broadly obovate to rotund, apex emarginate in lowermost, obtuse with acumen in upper ones, apical margins straight, not recurved, 2–2.5 × 1.9–2.5 cm, lowermost the largest, each bract subtending up to 6 or more flower pairs, abaxial and adaxial surface of bracts red, glabrous; bicarinate prophyll membranous, ovate-triangular, apex obtuse to 90°, apiculate, translucent red, 1.8–2.2 × 1.1–1.2 cm, 0.45–0.6 cm wide, carina to carina; secondary bract membranous, ovate, apex acute, translucent red, glabrous, 1.8–2 × 0.8–0.9 cm; bracteoles 1–2 per flower pair, 1.2–1.4 × ca. 0.15 cm, membranous, medial, carinate, or if 2, the second channeled, very narrowly elliptic to linear, glabrous. **Flowers** opening spontaneously. **Sepals** membranous, very narrowly elliptic to sublinear, apex obtuse, 15–16 × 2 mm. **Corolla** tube 15–16 mm, cream, glabrous except for a few appressed hairs in a line in apical 1/2, hairs 0.7–1 mm; corolla lobes subequal, elliptic, 6–6.5 × ca. 2 mm, acute, apical 2/3 purple, cream-colored toward base, glabrous. **Staminodes** 3; callose staminode, ca. 6 × 2.5 mm; cucullate staminode ca. 4 mm, data unavailable on outer staminode and stamen due to condition of specimen. **Ovary** smooth, pilose at apex, hairs colorless to 2 mm, ca. 2 mm. **Capsule** unknown.

Additional specimens examined: **ECUADOR. Napo:** Bermejo Oil Fields, off road from Baeza to Lago Agrio, 800–1000 m, 9 Feb 1986, A. Hirtz, C. Luer, J. Luer & A. Embree 2703 (MO 6383926); **Sucumbíos:** Sinangoe Station, Shishicho Ridge, Alto Aguarico drainage, above (S of) Río Cofanes, W of Puerto Libre, NW of Lumbaqui, access from Río Sieguyo, ridgeline trail above camp, foothills, short, 10–20 m tall, upper hill-forest on steep ridges, slopes on acid soils, 1300–1450 m, 00°12'01.3"N, 77°31'54.3"W, 14 Aug 2001, *R. Aguinda, N. Pitman & R. Foster 1323* (F 2231892).

FIG. 2. *Calathea fredii* H. Kenn. Holotype. Photo provided by Missouri Botanical Garden (*Neill 7537*, MO).

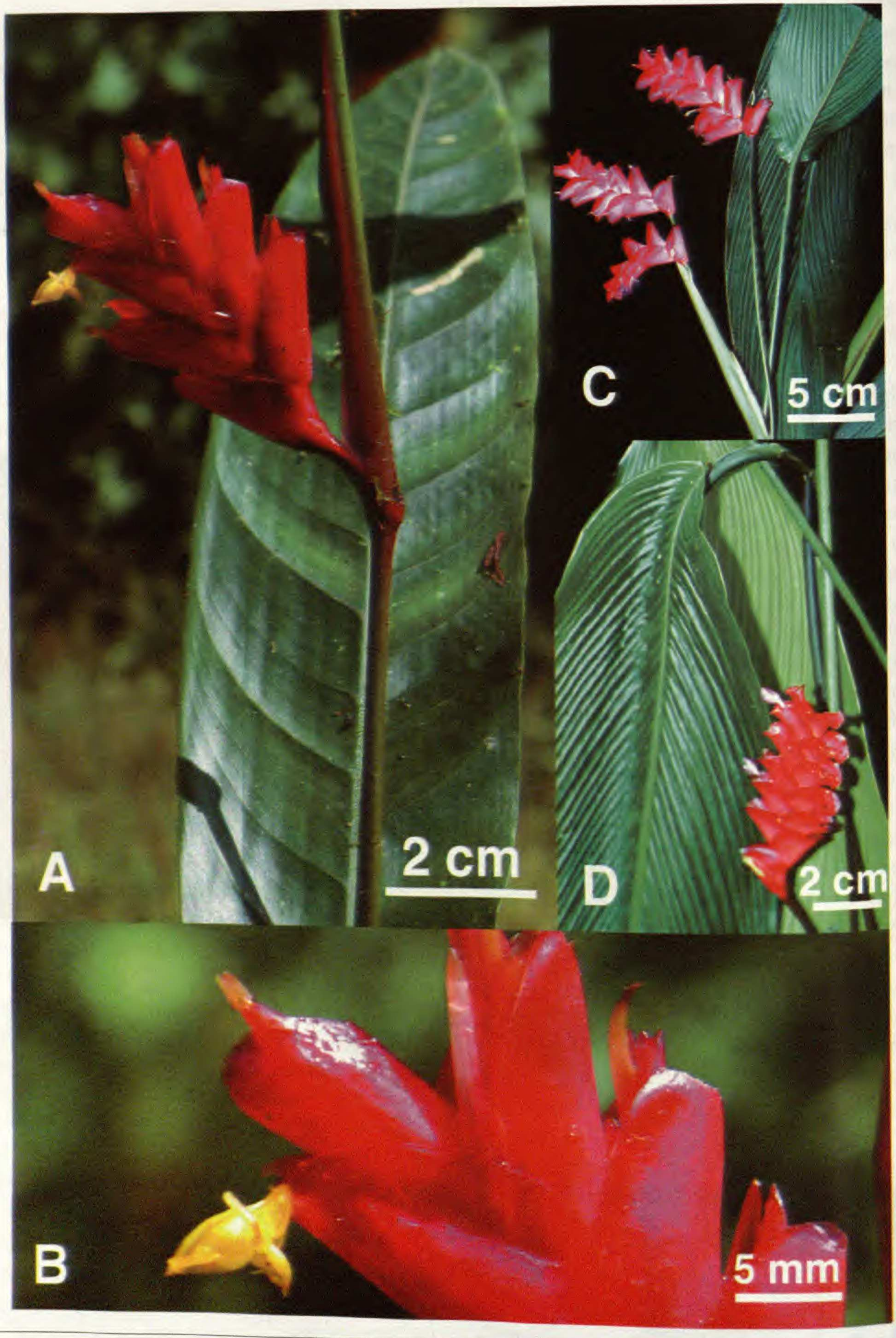

Fig. 3. *Calathea neillii* H. Kenn. **A.** Inflorescence and adaxial leaf surface. **B.** Detail of bracts and flower. *Calathea fredii* H. Kenn. **C.** Inflorescences and corrugated leaf showing abaxial surface at base. **D.** Inflorescence with flowers showing leaf adaxial surface at base. (A, B From type collection, *D. Neill, W. Quizhpe & D. Vela 16668*, photos by David Neill. C, D *R. Aguinda, N. Pitman & R. Foster 1323* (F), photos by Robin Foster.)

Distribution and habitat.—*Calathea fredii* is endemic to Ecuador. It occurs in eastern Amazonian Ecuador in Napo and Sucumbíos Provinces from 800–1450 m in premontane rain forest habitats. Flowering material was collected in December and February as well as in August.

Discussion.—*Calathea fredii* shares the similar habit and inflorescence of distichous bright red bracts with the related *C. neillii* and *C. trianae*. It would key out in Flora of Ecuador (Kennedy 1988: 47) under lead 31A because of the distichous bracts. It differs from *C. neillii* in the strongly corrugated vs. smooth leaf surface, the higher vein angle from midrib (73°–79° vs. 40°–50°) the narrower vein spacing (19–24 vs. ca.13 per 2 cm) and the purple and white vs. yellow petals. *Calathea fredii* differs from *C. trianae* by the strongly corrugated vs. smooth leaf surface, narrowly elliptic vs. elliptic leaf blade (length:width ratios [4.8–]5.24–7.45:1 vs. 3.55–4.58:1), and the purple and white vs. yellow petals. Also, it differs from *C. neillii* and *C. trianae* in lacking a bladed leaf subtending the inflorescence. Here the leaf is bladeless, reduced to essentially to the leaf sheath.

Etymology.—The specific epithet, *fredii*, is in honor of Fred R. Ganders, professor emeritus and former director of the UBC herbarium, in gratitude for his help writing the keys for the Flora of Ecuador treatment, supporting my research trips, paying for needed equiptment to carry out such work, as well as for many other trips to botanize and sample wine.

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